

REMARKS

The *Office Action* dated September 8, 2000 has been carefully reviewed, together with the references cited by the Examiner and the claims of the captioned application. For the reasons set forth below, it is believed that the claims are patentable over the prior art of record.

A. Rejections under 35 U.S.C. § 103

Claims 1-3 are rejected as being obvious in view of U.S. Pat. No. 5,699,986 by *Welk*, in view of U.S. Pat. No. 5,620,155 by *Michalek*. In the *Office Action*, the Examiner points out where in the *Welk* and *Michalek* references various limitations of Claim 1 are disclosed. However, the Examiner does not point out where in such references there is any suggestion or disclosure of storing in a database of the train collision avoidance system, heading data that specifies the heading of a road. Moreover, there is no suggestion or disclosure in either reference of programming a processor to correlate the heading data of a road with the heading of a vehicle so as to know when the vehicle is on a road that intersects with the grade crossing. These limitations are expressly set forth in Claim 1. There are many situations where automobile roads run parallel to the train tracks and where a second road intersects with the crossing. In those situations where the automobile is on the parallel road, there may be no need to provide an emergency warning to the vehicle. On the other hand, if the automobile is on the road that intersects with the crossing, and is in the vicinity of the intersection, then a situation exists in which the automobile must be more cautious.

In the *Welk* patent reference, the heading of the road vehicle is not determined or otherwise computed and thus is irrelevant to the invention disclosed therein. Moreover, in the system described in the *Welk* patent reference, if the automobile were on a road running parallel to the train tracks, there would be an alarm provided to the vehicle, even though the automobile road may run parallel to the train tracks and the automobile is miles from an intersection with the tracks. In the *Welk* reference, it is the geographical location of the train that is calculated, not the geographical location of the road vehicle. Even if the teachings of the *Michalek* patent were combined with those of the *Welk* reference, the invention of Claim 1 would not be made obvious.

The *Michalek* patent also does not disclose the storing of heading data of the road in a database to make a correlation with a heading of the road vehicle. Much like the *Welk* system, the signaling system disclosed in the *Michalek* patent is structured to determine the geographical location of the train, not the road vehicle. In the *Michalek* system, the train determines its geographical position by GPS coordinates. Processing data is also stored so that a processor on the train can determine when the train is approaching a railroad crossing. Wherein a train approaches a crossing, the predefined code of the crossing can be transmitted by the train to turn on the warning devices at the crossing. Any vehicle approaching the crossing can apparently know of an approaching train by visually looking at the activated warning device at the crossing. Fig. 4 of the *Michalek* reference discloses a road vehicle mounted receiver in which a signal transmitted from the train is received by the vehicle receiver. In this event, the vehicle would have a special digital-coded signal transmitted by the train to apparently turn on the visual or aural alert device within the automobile. Again, there is no suggestion that the direction of travel of the automobile is taken into consideration in either of the *Welk* or *Michalek* systems. For these reasons, Claim 1 is patentable in its own right over the cited prior art.

Claim 2

Claim 2 of the captioned application specifies that there is stored in the database, train grade crossing data associated with direction data that identifies a direction of a road that intersects with the railroad track at the grade crossing.

In the *Office Action* the Examiner also indicates that it would be obvious to modify the teachings of the *Welk* reference to provide vehicle location data that identifies a location of a vehicle to determine if the vehicle is approaching the railroad crossing to avoid a collision. However, in the disclosure pointed out by the Examiner in the *Michalek* reference, there are instances where the train location is determined with respect to the crossing. There is no suggestion that the geographical location of the automobile itself is determined, nor the heading of the road, as claimed. As noted in Fig. 4 of the *Michalek* reference, the apparatus installed in the vehicle only constitutes an approach receiver as well as a dashboard annunciator. In order to determine the heading of the vehicle and the geographical location of the vehicle, there would be required additional apparatus in the receiver,

not suggested in the *Michalek* patent reference. The only concern in the *Michalek* reference as to the automobile, is that it be within the range of receiving transmissions from the train. Once the train transmission is received, as well as the unique coded prefix for automobiles, the dashboard annunciator is caused to be activated. This activation occurs irrespective of the direction of travel of the automobile or the automobile's proximity to the railroad crossing. For these additional reasons, Claim 1 is not made obvious by the prior art of record.

In the *Office Action* the Examiner indicates that the *Michalek* reference discloses a database that stores direction data that identifies a direction of a road that intersects a railroad track. At Column 8, lines 1-23 of such reference, all references to the geographical location and direction of travel are those with respect to the locomotive, not with respect to an automobile. At Columns 9-10, lines 57-58 pointed out by the Examiner, there is again no suggestion for storing in association with train grade crossing data, additional direction data that identifies the direction of a road that intersects the railroad track at the crossing. As such, Claim 2 is patentable in its own right over the cited prior art.

Claim 3

Claim 3 specifies that the processor is programmed to receive the vehicle direction of travel data and compare the same with the data stored in the database. Again, the only direction of travel specified or otherwise noted in the *Michalek* reference is that of the locomotive itself. Indeed, since trains are limited to travel on tracks having specific routes, the direction of travel may not need to be determined, nor is the same indicated as being used in the *Michalek* reference.

B. Claim 4-6, 11, 9-13, 15 and 21 are rejected under 35 U.S.C. § 103 as being obvious over the *Welk* and *Michalek* references as applied in connection with Claim 1, and further in view of U.S. Pat. No. 5,554,982 by *Shirkey et al.* and U.S. Pat. No. 3,758,775 by *Hopkins*.

Claims 4-6 are believed to be patentable for the same reasons noted above.

Claim 11

Claim 11 specifies various limitations for avoiding collisions between a train and a vehicle. In the rejection of Claim 11, the Examiner specifies that the *Welk* reference discloses a processor programmed to use GPS data and train grade crossing data to determine if the vehicle is within a predefined distance from a grade crossing. At the location of Columns 5-6, lines 1-3, pointed out by the Examiner, the only GPS information utilized is that of the train itself. Here, the Examiner apparently correlates the train with the claimed "vehicle." In Amended Claim 11, it is now specifically noted that the first detector detects the geographical location of the vehicle, not the train. The Examiner points out in the *Office Action* that the *Michalek* reference discloses the receipt of a signal of vehicle location data that identifies the location of a vehicle to determine if the vehicle is approaching the railroad crossing. The location in the reference pointed out by the Examiner (Columns 4-5, lines 61-62) again specifies that it is the locomotive itself whose geographical location is determined. Again, the Examiner is correlating the claimed vehicle with the locomotive disclosed in the *Michalek* reference. The amendment of Claim 11 now overcomes the reference.

The Examiner concedes that the *Welk* and *Michalek* patents do not disclose a detector for detecting a geographical location and heading of the vehicle. The Examiner relies on the *Shirkey et al.* reference for such teaching. At Column 2, lines 44-53 of the *Shirkey et al.* reference, the geographical location detecting function is again carried out by the locomotive. There is no suggestion even at the noted locations in the references that the heading of any type of vehicle, whether it be train or otherwise, is utilized.

The Examiner correctly notes that the *Hopkins* reference discloses a detector for detecting the proximity of the train near a vehicle. However, much like the *Shirkey et al.* reference, the *Hopkins* reference does not disclose the utilization of the heading of the vehicle (not a train) to provide a sensory indication in order to avoid a collision with the train. Absent the teaching of the utilization of a heading parameter for a vehicle in the four references cited by the Examiner, a *prima facie* case of obviousness has not been established. It would not have been obvious to combine the teaching of the reference to arrive at the invention of Claim 11, which specifies a detector for detecting the proximity of a train near the vehicle, and a sensing device for providing data indicating

the heading of the vehicle, and using the heading of the vehicle with a programmed processor to provide a sensory indication. It is submitted that Claim 11 defines an invention not made obvious by the cited prior art.

Claims 7 and 8

Claims 7 and 8 specify that the vehicle location data is processed by changing the respective least significant bits of the latitude and longitude coordinates. The Examiner indicates that U.S. Pat. No. 5,739,768 by *Lane et al.* discloses this feature. At the locations noted by the Examiner in the *Lane et al.* reference, there is no indication whatsoever of processing GPS coordinate data by changing the least significant bits of the detected parameters. Rather, these locations in the *Lane et al.* '768 patent do not even refer to the processing of GPS data in any manner. Rather, these locations of such reference refer to the processing of a frame of data received from a train transmitter to verify that the transmission indeed originated by a train. None of the train data transmitted is disclosed in the reference as including GPS coordinates. Accordingly, absent a specific teaching of the subject matter of Claims 7 and 8, there can be no *prima facie* case of obviousness.

Claims 17 and 18

Claims 17 and 18 are believed to be patentable for the same reasons noted above in connection with Claims 7 and 8.

Claims 19 and 20

Claims 19 and 20 specify that the latitude and longitude coordinate parameters are dithered to different extents, as a function of the speed of the vehicle. The dithering of the coordinate location of the vehicle effectively changes the area of protection around the vehicle to determine if a railroad crossing is located therein. The Examiner contends that the *Welk* reference discloses this function, at Column 4, lines 3-60. Upon reading the *Welk* reference at these locations, there is no suggestion whatsoever of dithering the coordinate location of a vehicle for use in avoiding collision thereof with a train.

Claims 10, 14 and 16

Claims 10, 14 and 16 are rejected under 35 U.S.C. § 103 as being unpatentable over the *Welk*, *Shirkey et al.* and *Hopkins* references, and further in view of the *Michalek* reference. Claim 10, 14 and 16 are believed to be patentable for the same reasons noted above in connection with the independent claims from which such claims depend.

Claim 22

Claim 22 is rejected for the same rationale as set forth by the Examiner in connection with the other claims. Claim 22 is patentable for the same reasons noted above, in that the prior art of record does not suggest the use of the heading of one road intersecting the train crossing, and the direction of travel of the vehicle to provide a sensory indication for avoiding a 'potential for collision between a train and the vehicle. As such, Claim 22 is patentable in its own right over the prior art of record.

New Claim

New Claim 23 has been added to the application to further provide the protection to which the applicant is entitled. Claim 23 specifies, *inter alia*, a processor that is programmed to determine the geographical location of a road vehicle. The processor periodically calculates a location of the road vehicle and also defines an envelope circumscribing the road vehicle. The processor then reads data from a database specifying the geographical locations of railroad intersections to determine if an intersection lies within the envelope of protection. If so, a warning is provided to the road vehicle.

New Claim 23 distinguishes from the cited prior art, especially the *Shirkey et al.* reference. In the *Shirkey et al.* reference, boundary coordinates are transmitted by the railroad crossing apparatus to oncoming vehicles. In this situation, the boundary coordinates 50 (Fig. 2) are fixed with respect to the fixed coordinates of the crossing and circumscribe the railroad intersection. This is in contrast to the invention of Claim 23, where the processor of the road vehicle defines an envelope of protection around the road vehicle. In this case, the envelope of protection moves with the vehicle. As such, the invention is Claim 23 is patentable over the prior art of record.

Conclusion

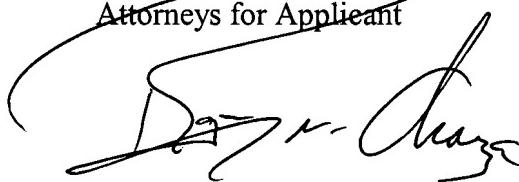
From the foregoing, the prior art cited by the Examiner does not establish a *prima facie* case of obviousness. For one thing, the claims specify the use of the heading of the vehicle as a parameter in the system for avoiding collisions with trains. The use of the heading of a vehicle can avoid unnecessary alarm conditions, such as when a crossing is within the area of protection of the vehicle, but the vehicle has crossed the intersection and is moving away therefrom. In this case, there is no concern that a collision will occur, as the vehicle is moving away from the crossing. The Examiner is respectfully requested to reconsider the rejections in view of the foregoing, and grant full allowance of the claims.

A check is enclosed in the amount of \$49.00 to cover the fee for a small entity for the additional claims added to the application.

Applicant has now made an earnest attempt in order to place this case in condition for allowance. For the reasons stated above, Applicant respectfully requests full allowance of the claims as amended. Please charge any additional fees or deficiencies in fees or credit any overpayment to Deposit Account No. 20-0780/DVSS-25,152 of HOWISON, CHAUZA, HANDLEY & ARNOTT, L.L.P.

Respectfully submitted,

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